**Reuse that water**

Graywater gets a sunnier future in CEE senior project

**D**rought.
We’re facing one this summer, and wherever you’ll be in California, you’ll need to conserve water.

One way is to reuse indoor graywater. That’s water you use to brush your teeth, wash your clothes or take a shower — anything but toilet and kitchen sink water. Instead of using it once, what if it were automatically filtered and rerouted to toilets or your garden to be used again?

The concept isn’t new, and here and there, people have cobbled together graywater systems. Studies suggest these could save 30 percent of a home or building’s water usage. But, unlike recycling paper or aluminum cans, recycling indoor graywater remains uncommon because no regulations or codes exist for implementing a safe,

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proven system. A group of CEE seniors hopes to change that.

David Leung, Vu Le, Anthony Hoac and Medford Xie didn’t know much about graywater before selecting their project for CEE professor Bob Bea’s capstone course, CE 180, Engineering Systems. Now they’re converts to the idea, even lowering their own water use to embrace the spirit of the project.

The group’s goal by the end of the semester is to answer indoor graywater’s most pressing questions: To what degree must the water be treated so it’s safe for reuse in non-consumptive ways? What’s the most cost-effective treatment and rerouting system that uses the least energy and is kindest to the Earth? What regulations are needed for new construction? How should the public be educated so graywater reuse becomes popular?

“We’ve opened a Pandora’s box,” says Le, “but in a good way. Once you start to research this, you realize there’s so much potential.”

The team is consulting with San Francisco’s Transbay Terminal Redevelopment District project on whether a graywater system might work on new buildings there. The seniors have developed a design for a three-story office building that uses existing technologies and others under development to create a multiple-step system that captures, treats and reroutes water. Two of three filtering technologies are biological: a green “living” roof to capture and treat rainwater from the outside; and a vertical, hydroponic filtering system inside, where graywater flows down through walls filled with pea and dirt, a natural process to remove particles, to water plants growing out from the walls.

“These were the most practical measures in terms of cost,” says Leung. “Believe it or not, the biological systems are pretty low maintenance, and of course they’re more sustainable than traditional technologies.”

The team is also writing a technical paper to submit to the American Society of Civil Engineers in hopes of promoting a regulatory discussion. Currently, the only proposed state regulation would make it illegal to route graywater to other indoor uses without treating it first.

Catch the team and other final presentations from CE 180 on Tuesday, May 12, from 8:30 to noon in 502 Davis Hall.

Learn more at graywater.net.
announcements

Here comes E-Week

The annual event is back — and bigger and better than ever. Engineers’ Week will take place APRIL 13–17. In grand celebration of Berkeley Engineering-ness, it will feature day and night activities, so there’s no excuse not to come out and mingle with your fellow engineers. Satisfy your hunger each day at noon at a club-sponsored BBQ by the North Gate. Compete for prizes in several competitions, including a quiz bowl and an engineering Olympics that pits major against major and will decide once and for all who is the best engineer! Make your plans now and get all the details at ejc.berkeley.edu.

Be a tour guide for the day

We need six College of Engineering students to lead tours of the college from 11 a.m. to 12 p.m. on Cal Day, SATURDAY, APRIL 18. Talk to prospective students and their parents about your experiences at Cal and your favorite spots on northside! In appreciation of your “tour duty,” you’ll get free lunch, our unbounded gratitude and a thank you gift! To volunteer, contact Dawn Kramer at dkramer@berkeley.edu.

Commencement registration

Commencement 2009 will be a traditional all-college ceremony held on Saturday, May 23, from 8:30 a.m. to 12 p.m., at Hearst Greek Theatre. Departmental receptions will follow at various campus locations. Visit the official website www.coe.berkeley.edu/commencement to register online to participate in Commencement and reserve your tickets. There is a six-ticket limit per graduating student. Registration deadline is MONDAY, APRIL 20. If you have questions, please contact Dawn Kramer at dkramer@berkeley.edu.

Get the intel on Intel

On THURSDAY, APRIL 21, Intel chairman Craig Barrett will deliver the Dow Distinguished Lectureship in Materials Science and Engineering in Support of Society as part of the college’s View from the Top lecture series. The event will begin at 4 p.m. in Sibley Auditorium and a reception will follow. www.coe.berkeley/events/view-from-the-top

Graduating this semester?

In order to graduate, you must declare your candidacy, commonly called “placing yourself on the degree list.” If you fail to officially place yourself on the degree list, you will not graduate this spring, whether you’ve completed all requirements or not. Graduate in this sense does not mean participating in the Commencement ceremony — it means earning a degree from Cal. Check Bear Facts today to verify if you are on the Spring 2009 degree list, which will say Bachelor of Science, Spring 2009. Questions? Contact the Student Affairs Office at 642-7594.

Teach E 98

Want to share everything you wish you had known as a freshman engineer? We are looking for passionate instructors to teach E 98 in Fall 2009. E 98 is a fun DeCal class designed to help freshmen engineers get the most out of Berkeley. Each section meets one hour a week, with three instructors and 20 students. E 98 is an amazing opportunity to build teaching and communication skills, and it works around your schedule! Apply online at e98.berkeley.edu.

extreme engineering

Futuristic, but real projects featured in Popular Science

Name: Sheikh Rashid bin Saeed Crossing
The Challenge: Construct the world’s tallest arch bridge on a bed of sand
Where: Dubai, United Arab Emirates
Cost: $817 million
Estimated Completion: 2012
Excerpt: “Instead of installing the standard arch abutment, engineers will drill 200 holes — six and a half feet wide and 130 feet deep, half vertical and half inclined — and fill them with steel-reinforced concrete. Spaced about 20 feet apart and topped off with a concrete cap, the enormous foundations can absorb and dissipate the full force of the bridge.”

Name: Alternative Multifunctional Underground Space
The Challenge: Hollow out 900 million cubic feet of earth to make a watertight underground urban oasis
Where: Amsterdam
Cost: $14.4 billion
Estimated Completion: 2028
Excerpt: “The only way to create a stable construction site for the massive excavation on Amsterdam’s marshy ground is to fill in the 17th-century canals with sand and dig down through them. The [underground] space will span 31 miles of canals and contain roads, malls, sports arenas and anything else you’d find above-ground — except, of course, sunlight.”

Read more details and see illustrations at www.popsci.com.
Who says engineers care only about their classes?

This year, a group of engineering students launched BEAM (Berkeley Engineers and Mentors), an outreach program run entirely by undergraduates that puts scientists in local schools to teach weekly science activities and spend one-on-one time with children. So far, 40 engineers have participated and mentored about 100 middle and high schoolers, many from disadvantaged backgrounds. The field work is supported by a Decal class, led by juniors and seniors, which helps mentors develop skills and strategies to teach science to younger kids.

“It really helps to relate science to what’s happening in these kids’ everyday lives,” explains ME senior Perry Johnson, a BEAM co-founder and facilitator. “Make it fun and don’t get hung up on terminology. The point is to show them science is a lot cooler than they thought.”

Each week BEAM mentors lead an activity such as making ice cream from liquid nitrogen and rock salt or building small rockets. One popular activity is teaching evolution with M&Ms: Each child is given a fork, a spoon, a pair of chopsticks and a pile of M&Ms. During every round, participants pick a utensil and gather as many M&Ms as they can in a certain amount of time, or they “die.” The survivors all end up using spoons, a sweet illustration of how nature selects for certain traits that best help members of a species survive.

“As engineers, there are things we can do in our free time that aren’t for ourselves,” says BioE senior Mike Lin, another co-founder and facilitator. “We’re so well off in getting a Berkeley education that we should divert some time and energy for others.”

Undergraduates can volunteer a whole semester or just a week or two, say organizers. Helping in the BEAM program also fulfills many clubs’ community service requirements. (Clubs that actively partner with the BEAM program are: Society of Women Engineers, Hispanic Engineers and Scientists, Pi Tau Sigma, Bioengineering Honor Society and Biomedical Engineering Society.)

BEAM began as a way for community outreach offices in several engineering clubs to pool their resources and work together on a coordinated outreach effort. The end goal is not to recruit the next generation of engineers per se, but to foster a self-propelled desire to learn that will aid young students in whatever career they decide.

Already, BEAM has seen results. A middle schooler named Fred discovered a love of robots, thanks to one activity. Later, he took the initiative to seek out an internship in robotics as a high school student and even came to an ME 102 open house. When he saw the various robotic projects built by undergraduates, Fred told Johnson, “Yeah, that’s what I want to do.”

“You should do it,” Johnson replied. “And you can do it.”

The experience has changed BEAM mentors, too. Johnson always wanted to work in the aerospace industry. Now he’s going to graduate school. He wants to become a professor and teach.